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ABSTRACT

Different formats for four types of research items were studied for ease of computer data entry. The types were: (1) numeric response items; (2) individual multiple choice items; (3) multiple choice items with the same response items; and (4) card column indicator placement. Each of the 13 experienced staff members of a major university's Data Entry office rated format examples for ease of entry, identified the most preferred example, and answered other questions regarding design preference. Findings indicate the preferred instrument format would include: dashes or blanks with no embedded periods (continuous lines) for numeric or dollar amounts; vertical listing of response options for individual multiple choice items with a blank beside each option to be checked and the card column indicators in the margin; columnar listings of numeric codes to be circled and response labels at column heads for multiple choice items with the same response options; and card column indicators placed in the right margin. Instrument design utilizing these preferred elements should be consistent in response format and in card column indicator placement. Format preference does not insure the fastest or most accurate entry, but should be one of several instrument design considerations. The questionnaire used for this study is appended. (BS)

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Instrument Formatting with Computer Data Entry in Mind

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When large numbers of subjects are used in a research project, the data are frequently analyzed by computer. Many researchers collect the data, then transfer the data to coding sheets before entry into the computer. Recording the data onto the coding sheets can take approximately as long as the actual data entry and, in addition, introduces another possible source of error. In many instances it is possible to format the data collection instrument so that the data can be entered directly from that instrument without having to use coding sheets.

There are a variety of ways in which instruments can be formatted for computer data entry. The appearance of the instrument may be very important if it is a mail questionnaire to be filled out and returned at the will of the respondent. In that case formatting the instrument for data entry is probably of secondary importance, because if the questionnaires are not returned there are no data to enter. In other instances, such as phone or personal interview surveys, the appearance of the instrument is of lesser importance. The potential distraction of card column indicators and response codes have little to do with whether or not the respondent chooses to answer the questions since the interviewer records the responses and the respondent may never actually see the instrument.

While there are different ways of formatting the same type of item, it may be that one or more ways are preferred by those who actually enter the data. This investigation was undertaken to examine the preferences of data entry personnel with regard to four situations: numeric response items, individual multiple choice items, multiple choice items in which there are several items with the same response options, and card column indicator placement. Some of the more common examples have been used due to the difficulty of including all possible examples for each of the four design elements.

It is acknowledged that these are not the only types of items or format considerations and that any results obtained pertain only to the type included in this research.

Method

Subjects

The subjects were 13 females comprising the Data Entry staff at a major university. One individual was the manager, while the other 12 were professional data entry employees. They had been employed in data entry for from three to twenty-one years, with three employees having twenty or more years of experience. The average was 12 years.

The Data Entry office is primarily responsible for entry of data for administrative purposes at the institutional level. When time permits, data entry assignments from other individuals and groups within the university setting are also accepted. Data can be entered directly from data collection instruments when properly formatted.

Instrument

Ease of Entry. A data collection instrument was designed to determine the ease of entry of various types of formats for numeric response items, individual multiple choice items, sets of multiple choice items having the same response options, and card column indicators. Several format options were selected for each of the four areas being investigated based on a variety of actual instruments and examples of instruments found in resource and textbooks. The numeric response section contained five examples; the individual multiple choice section had ten items; the sets of multiple choice

items consisted of eight formats; and the card column indicator placement section included four examples.

Beside each example, the subject rated the format on the following basis: 1. Very Difficult; 2. Difficult; 3. Not Sure; 4. Easy; or 5. Very Easy. The subject was directed to consider the ease or difficulty of entering an entire survey or questionnaire formatted like the example.

Preferences and Forced Choice. At the end of each of the four sections, the respondents were asked to identify the example they would most prefer from among those presented. In addition, multiple choice questions were included at the ends of three sections in an attempt to pinpoint specific design preferences.

The final page of the instrument elicited the number of years of experience of the respondent, the most troublesome type of format or survey structure for them to enter, and their opinions regarding the difficulty of left-hand stapling when card column indicators (and answer blanks) were along the left-hand side of the page.

Results

Numeric

Ease of Entry. For numeric responses, the example showing answer blanks or lines vertically aligned along the right side of the page (example B) was easiest to enter as shown by the highest rating mean (4.33). (See Section I.) This was the only example which was not marked by a single respondent as either Difficult or Very Difficult.

Preferences, Forced Choice. At the end of that section only four respondents designated a preference for any numeric response format shown, and each of those four selected a different format. When forced to consider specific

elements in the formats through the multiple choice items, the largest numbers of data entry personnel preferred lines (n=8), no periods (n=7), and aligning answers along the right side of the page (n=8).

Individual Multiple Choice

Ease of Entry. The individual multiple choice format with the highest overall mean was example B, which showed choices aligned vertically along the left side of the paper beneath the item, with the answer blank and answer code (in parentheses) to the left of the response option. (See Section II.) Examples B and E (which are identical except for the use of parentheses) were rated either Easy or Very Easy by all respondents. The two examples with the lowest means (examples I and J) were the only two with a blank in which to write the number of the answer rather than having the respondent check beside or circle the answer.

Preferences, Forced Choice. Only three respondents identified a preferred example for Individual Multiple Choice items. Dashes (fill in the code, as in examples I and J), dashes (check one) and blocks were nearly equally preferred on the first forced-choice item at the bottom of the page. Placing the number beside the answer and next to the line (example B), and vertical listing of answers (examples A, B, and E) were preferred by seven of the eleven completing items 2 and 3.

Several Multiple Choice Items

Ease of Entry. When several multiple choice items with the same response options were presented, examples A and B were perceived as being the easiest to enter as indicated by means of 4.23 and 4.00 respectively. (See Section III.) Both have response options presented in columns with the response label at the top of each column and a specific number code to be circled or a blank to be checked. Example F, which had the third highest mean, also has the response options in an arrangement similar to columns.

Column arrangement with answer cues (example H) was seen as most difficult to enter ($\bar{x} = 2.33$). Example C ($\bar{x} = 2.54$) was the only other example in the entire instrument with a mean below 3.00. Both H and C placed number codes only at the tops of the columns, and in example C there was no structured method of lining up answers with items horizontally.

Preferences. Preferences were expressed for only four of the examples. Example A was the preference of five respondents, example G (which was ranked fifth with a mean of 3.58) was preferred by four, while example F (ranked third) was preferred by two and example B by one respondent.

Card Column Indicator Placement

Ease of Entry. Card column indicators placed beneath answer blanks (example C) or to the right of the answer blank along the right side of the page (example D) were rated easiest to enter ($\bar{x}_c = 4.09$; $\bar{x}_d = 4.00$). (See Section IV.)

Preferences, Forced Choice. When asked to indicate a preference, respondents were fairly evenly divided with three each citing examples B and D, two respondents each preferring A and C. Individual format elements of placing card column indicators in the right margin (example D) and indicators beside the answer blank (example B and D) were each preferred by over half of those responding.

General Format Problems

In response to the questions on the last page of the instrument, respondents most frequently cited answers which are scattered on the page as being the most troublesome type of format or survey structure for them to enter (n=4). Also listed as most troublesome by one respondent each were: when both sides of the page are used, when preceding digits are not included, when card column indicators are not close to the answer, use of answer blocks, and card column indicators with answer on the left.

Discussion and Conclusions

While the number of subjects was limited, those responding did comprise the entire group of data entry personnel at a major university and were professionals in the field with years of experience. Their qualifications make them eminently qualified to provide the information sought in this study.

Forced choice preferences supported the ease-of-entry ratings for formatting numeric response items with the use of lines with no periods (for dollar amounts) that are vertically aligned along the right side of the page. There was some consistency but also some inconsistency regarding individual multiple choice item formats. The format rated easiest also contained preferred elements of dashes to be checked, numbers beside the answer options, and vertical listing of answer options. However, the response format of dashes with the number code of the answer to be written in was preferred by the largest number of respondents although the two examples (I and J) which used this format were tied in the rankings as the most difficult. Placement of the number code following the item, use of parentheses, and circling the answer from a horizontal listing were preferred by only a single individual each and are probably best avoided if possible.

For a group of multiple choice items with the same response options, the most preferred format and also the easiest one to enter utilized answer codes to be circled which are arranged in columns with each column appropriately labeled with the response option. Both of the highest ranked group multiple choice formats (A and B) can easily be adapted to the right-side alignment of card column indicators which was preferred in the section on indicator placement. Respondents did not like vertical listing of responses when there were several items with the same response options. The three examples that

were ranked as most difficult (H, C, and E) were preferred by none of the respondents and, again, should probably be avoided.

While example C for card column indicator placement was rated easiest to enter, the individual elements in that example of having card column indicators embedded in the instrument (not aligned) and beneath the responses were preferred by only one or two individuals. The preferences for individual design elements relating to card column indicator placement were for indicators to be placed in the right margin and beside the answer blank, both of which are illustrated in example D whose mean on ease of entry was very close to that of the first-ranked format. It is possible that in example C, the preference was for indicators beneath the answer blanks because the answer blanks were not consistently placed on the page.

In summary, the instrument format preferred by the data entry personnel would include: dashes or blanks with no embeded periods (continuous lines) for numeric or dollar amounts; vertical listing of response options for individual multiple choice items with a blank beside each option to be checked and the card column indicators placed in the margin; columnar listing of numeric codes to be circled and response labels at the heads of the columns for multiple choice items in which there are several items with the same response options; and card column indicators placed in the right margin. Individual design elements preferred must be blended into an overall instrument design that utilizes consistency in both the format for responses and in placement of card column indicators.

This study is limited in that only brief examples of different types of formats were used rather than complete instruments. If respondents had had complete instruments representing various ways of formatting, their responses might have differed from those expressed in this study. The use of complete

instruments was considered but abandoned because of the length of time involved on the part of the respondents. It is also possible that although the respondents expressed a preference for a particular type of format, there might have been others more preferable which were not included among the choices.

This study did not attempt to determine the relationships between format preference, speed, and accuracy of entry. Respondent preference for a format does not insure that that is the format which would provide for fastest or most accurate entry. In terms of cost effectiveness, these questions also need to be answered. In any instrument, a balance must be found between processing considerations and those affecting the confidence that can be placed in the accuracy of responses due to clarity of format and the return rate.

SECTION I

NUMERIC RESPONSES

		Ease of Entry						
		Very Difficult	Difficult	Not sure	Easy	Very Easy	x̄	Rank
A.	How much does your household spend per week for food? $_____	1	2	3	4	5		
	How much does your household spend per week for gasoline/travel? $_____	(1)	(0)	(2)	(8)	(1)	3.67	3
	How much does your household spend per week for entertainment? $_____							
B.	How much does your household spend per week for food? $_____	1	2	3	4	5		
	How much does your household spend per week for gasoline/travel? $_____	(0)	(0)	(1)	(6)	(5)	4.33	1
	How much does your household spend per week for entertainment? $_____							
C.	How much does your household spend per week for food? $___.__	1	2	3	4	5		
	How much does your household spend per week for gasoline/travel? $___.__	(0)	(2)	(1)	(5)	(4)	3.92	2
	How much does your household spend per week for entertainment? $___.__							
D.	How much does your household spend per week for food? $☐☐☐.☐☐	1	2	3	4	5		
	How much does your household spend per week for gasoline/travel? $☐☐☐.☐☐	(2)	(3)	(2)	(2)	(3)	3.08	5
	How much does your household spend per week for entertainment? $☐☐☐.☐☐							
E.	How much does your household spend per week for food? $_____	1	2	3	4	5		
	How much does your household spend per week for gasoline/travel? $_____	(1)	(1)	(1)	(9)	(0)	3.50	4
	How much does your household spend per week for entertainment? $_____							

Which do you prefer?_____ A, 1; B, 1; C, 1; D, 1

Do you prefer: (check one in each group)

1. __8__ Lines
   __1__ Dashes
   __3__ Blocks

2. __5__ Period (__.__)
   __7__ No Period (_____)

3. __4__ Answer at end of question
   __8__ Answer along right side of page
   __0__ Answer beneath item, to left side of page

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SECTION II
MULTIPLE CHOICE

		Very Difficult	Difficult	Not Sure	Easy	Very Easy	x̄	Rank
A.	Age: (check one) 18-29 ☐ 1 30-49 ☐ 2 50 years and older ☐ 3	1	2	3	4	5		
		(0)	(1)	(2)	(7)	(2)	3.83	6
B.	Age: (check one) _____ (1) 18-29 _____ (2) 30-49 _____ (3) 50 years and older	1	2	3	4	5		
		(0)	(0)	(0)	(9)	(3)	4.25	1
C.	Age: (check one) 1 ☐ 18-29 2 ☐ 30-49 3 ☐ 50 years and older	1	2	3	4	5		
		(0)	(2)	(1)	(7)	(2)	3.75	7.5 (tie)
D.	Age: (check one) _____ (1) 18-29 _____ (2) 30-49 _____ (3) 50 years and older	1	2	3	4	5		
		(0)	(0)	(1)	(8)	(3)	4.17	2
E.	Age: (check one) _____ 1. 18-29 _____ 2. 30-49 _____ 3. 50 years and older	1	2	3	4	5		
		(0)	(0)	(0)	(11)	(1)	4.08	4 (tie)
F.	Age: (check one) _____ 18-29 (1) _____ 30-49 (2) _____ 50 years and older (3)	1	2	3	4	5		
		(1)	(1)	(C)	(8)	(2)	3.75	7.5 (tie
G.	Age: (check one) 18-29 ( ) 1 30-49 ( ) 2 50 years and older ( ) 3	1	2	3	4	5		
		(0)	(1)	(1)	(6)	(4)	4.08	4 (tie
H.	Age: (circle one) 1. 18-29 2. 30-49 3. 50 years and older	1	2	3	4	5		
		(0)	(1)	(0)	(8)	(3)	4.08	4 (tie
I.	Age:_____ (from list below) 1. 18-29 2. 30-49 3. 50 years and older	1	2	3	4	5		
		(1)	(2)	(0)	(6)	(3)	3.67	9.5 (tie
J.	_____ Age (from list below) 1. 18-29 2. 30-49 3. 50 years and older	1	2	3	4	5		
		(1)	(2)	(0)	(6)	(3)	3.67	9.5 (tie

Which of the examples above do you prefer? B, 1; G, 1; J, 1

Do you prefer: (check one in each group)

1. 3 Dashes (check one)
   3 Blocks
   1 Circle the answer
   1 Parenthesis
   4 Dash (fill in the number (I or J)

2. 3 Number on other side of block/line (Ex. A)
   7 Number beside the answer, next to line (Ex. B)
   1 Number after the item (Ex. F)

3. 4 Horizontal list of answers (C, D, H.)

SECTION III

III. SEVERAL MULTIPLE CHOICE ITEMS WITH SAME RESPONSE OPTIONS

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						Ease of Entry						
						Very Difficult	Difficult	Not Sure	Easy	Very Easy	x̄	Rank
						1	2	3	4	5		
A.	Circle one:	Very Good	Good	Fair	Poor							
	Organization and planning	1	2	3	4							
	Communication	1	2	3	4	(0)	(1)	(0)	(7)	(5)	4.23	1
	Quality of presentations	1	2	3	4							
						1	2	3	4	5		
B.	Check one:	Very Good (1)	Good (2)	Fair (3)	Poor (4)							
	Organization and planning	___	___	___	___							
	Communication	___	___	___	___	(0)	(0)	(1)	(11)	(1)	4.00	2
	Quality of presentations	___	___	___	___							
						1	2	3	4	5		
C.	Check one:	Very Good (1)	Good (2)	Fair (3)	Poor (4)							
	Organization and planning					(2)	(5)	(3)	(3)	(0)	2.54	7
	Communication											
	Quality of presentations											
						1	2	3	4	5		
D.	Check one:											
	Organization and planning	Very good (1)	Good (2)	Fair (3)	Poor (4)	(1)	(2)	(1)	(6)	(3)	3.62	4
	Communication	Very good (1)	Good (2)	Fair (3)	Poor (4)							3
	Quality of presentations	Very good (1)	Good (2)	Fair (3)	Poor (4)							
						1	2	3	4	5		
E.	Circle one:	1 Very good, 2 Good, 3 Fair, 4 Poor										
	Organization and planning	1	2	3	4	(1)	(4)	(0)	(5)	(3)	3.38	6
	Communication	1	2	3	4							
	Quality of presentations	1	2	3	4							

III (Continued)

	Very Difficult	Difficult	Not Sure	Easy	Very Easy	x̄	Rank
	Ease of Entry						

F. Check one:

	1	2	3	4	5		
Organization and planning	(0)	(2)	(0)	(9)	(1)	3.75	3

( )1. Very good ( ) 2. Good ( ) 3. Fair ( ) 4. Poor

Communication

( ) 1. Very good ( ) 2. Good ( ) 3. Fair ( ) 4. Poor

Quality of presentations

( ) 1. Very good ( ) 2. Good ( ) 3. Fair ( ) 4. Poor

G. Check one:

	1	2	3	4	5		
Organization and planning	(1)	(2)	(0)	(7)	(2)	3.58	5

____ 1. Very good
____ 2. Good
____ 3. Fair
____ 4. Poor

Communication
____ 1. Very good
____ 2. Good
____ 3. Fair
____ 4. Poor

Quality of presentations
____ 1. Very good
____ 2. Good
____ 3. Fair
____ 4. Poor

H.

Circle one:	Very Good (1)	Good (2)	Fair (3)	Poor (4)	1	2	3	4	5		
					(2)	(7)	(0)	(3)	(0)	2.33	8
Organization and planning	VG	G	F	P							
Communication	VG	G	F	P							
Quality of presentations	VG	G	F	P							

Which do you prefer?_____ A, 5; B, 1; F, 2; G, 4

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SECTION IV

IV. PLACEMENT OF CARD COLUMN INDICATORS

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	Ease of Entry: Very Difficult	Difficult	Not Sure	Easy	Very Easy	x̄	Rank
A. What did you do during summer vacation? (Mark as many as apply to you)	1	2	3	4	5		
_____rested/traveled (cc1) _____worked at another job (cc2) _____taught summer school (cc3) _____took courses (cc4) _____none of the above (cc5)	(1)	(3)	(1)	(6)	(0)	3.09	4
If you were employed in another job, how many hours did you work per week? (cc6-7) _____							
B. What did you do during summer vacation? (Mark as many as apply to you)	1	2	3	4	5		
(cc1) _____rested/traveled (cc2) _____worked at another job (cc3) _____taught summer school (cc4) _____took courses (cc5) _____none of the above	(1)	(3)	(0)	(4)	(3)	3.45	3
If you were employed in another job, how many hours did you work per week? (cc6-7) _____							
C. What did you do during summer vacation? (Mark as many as apply to you)	1	2	3	4	5		
rested/traveled _____ (cc1) worked at another job _____ (cc2) taught summer school _____ (cc3) took courses _____ (cc4) none of the above _____ (cc5)	(0)	(1)	(0)	(7)	(3)	4.09	1
If you were employed in another job, how many hours did you work per week? _____ (cc6-7)							
D. What did you do during summer vacation? (Mark as many as apply to you)	1	2	3	4	5		
rested/traveled _____ (cc1) worked at another job _____ (cc2) taught summer school _____ (cc3) took courses _____ (cc4) none of the above _____ (cc5)	(0)	(1)	(2)	(4)	(4)	4.00	2
If you were employed in another job, how many hours did you work per week? _____ (cc6-7)							

Which of the examples do you prefer?_____ A, 2; B, 3; C, 2; D, 3

Do you prefer: (check one in each group)

1. 2 cc in left margin (Ex. B)
   7 cc in right margin (Ex. D)
   2 cc embedded in questionnaire (Ex. A,C)

2. 7 cc beside answer blank (Ex. B, D)
   4 cc beside response (Ex. A)
   1 cc beneath response (Ex. C)